CT 00-013
PATENT

Terminal Disclaimer

A statutory disclaimer in compliance with 37 C.F.R. 1.321(c) is attached hereto.

Remarks

Entry of the attached disclaimer and reconsideration of this application is in view of the amendments presented herein and remarks that follow is requested. Claims 1, 10, 11, and 18 have been amended to more specifically claim the invention. Claims 2 and 12 have been canceled herein. Claim 19 was previously cancelled. Claims 1, 3-11, 13-18, 20 and 21 remain pending in the application.

Objections to the Claims

The Examiner has objected to claims 12, 12, and 18 for various informalities. More specifically, the Examiner has objected to claim 1, stating that the term "the monolithic structure" should be changed to "the monolithic ceramic carrier". The applicant in response, has amended claim 1 as suggested by the Examiner.

Next, the Examiner has objected to claims 12 and 18 stating that the term "structure" should be inserted after the phrase "the ceramic carrier" for consistency in claim terminology. The applicant in response has amended claims 12 and 18 as suggested by the Examiner.

It is believed that these amendments to the claims overcome the Examiner's objections.

Claim Rejections – 35 U.S.C. § 112

The Examiner has rejected claims 1-17 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 1, the Examiner has stated that it is unclear as to the structural limitations the applicants are attempting to recite by "at least one channel formed in the monolithic structure and having a catalyst material formed therein for transporting a vapor in the vaporization zone." The Examiner states that it is unclear as to where such a limitation regarding the placing of a catalyst material in the channels of the vaporization zone is disclosed. The Examiner asserts that in the specification it appears that only "an inert porous ceramic material for thermal control" is provided in the channels of the vaporization zone. The Examiner additionally notes a similar claim in claim 11.

The applicant in response has amended claim 1 to state the inclusion of at least one channel formed in the ceramic carrier for transporting a liquid fuel to the vaporization zone, and at least one channel for transporting a vapor in the reaction zone. The actual catalyst material is now claimed as found within the reaction zone. It is believed that these amendments to claim 1 clarifies the previous unclear claim language.

Next, the Examiner has stated the inclusion of unclear relationships between "a vaporization zone" in claim 2, and "a vaporization zone" in claim 1, and "an integrated heater" in line 2, and "an integrated heater" in claim 11. The applicants in response have cancelled claims 2 and 12. It is believed the cancellation of these claims overcomes the Examiner rejection.

Claim Rejections – 35 U.S.C. § 102

The Examiner has rejected claims 1-3, 5-8, 10-16 and 18, 20 and 21 under 35 U.S.C. 102(b) as being anticipated by Hsu et al., U.S. Patent No. 5, 858,314, hereinafter referred to as Hsu. The Examiner in making this rejection states that Hsu discloses an apparatus comprising: a monolithic ceramic carrier defining a fuel processor, the fuel processor including a vaporization zone and a reaction zone including a reforming catalyst material; at least one channel formed in the monolithic structure and having a catalyst material formed therein for transporting a vapor in the vaporization zone; and inlet channel for introducing liquid fuel into the fuel processor; and an outlet channel for transporting hydrogen enriched gas out of the fuel processor. The Examiner further enumerates specific rejections as to each claim. The applicant in response respectfully disagrees with the rejections in light of the amendments to the claims and remarks made herein.

The applicant again asserts that Hsu discloses a reactor built using discrete pieces of ceramic plates, with catalyst deposited on them and having thermally

conducting plates interleaved between these ceramic plates, and gas manifolds to feed reactants and to get output gases. The entire assembly is sealed in a gas tight enclosure/housing to make the reformer unit. Hsu utilized discrete pieces to assemble the unit, which according to the disclosure are housed within a gas-tight housing to form a peripheral axial manifold. The assembly of Hsu connects with these gas manifold to feed reactants and to the output gasses, inevitably forming a large unit. For an assembly of this type, one would require gas tight sealing between the plates, and if the plates are made of ceramic materials then be of sufficient thickness to avoid cracking during assembly. If the plates are thicker then it would be difficult to maintain thermal uniformity and good heat transfer between the combustion and reforming sections.

The assembly of Hsu is not sintered, integral or monolithic in structure. The applicants assert that the term integral, as now included in the independent claims, is defined as a complete unit or a whole. The applicants agree with the Examiner's definition that the term monolithic, as now included in the independent claims is defined as constituting or acting as a single, often rigid, uniform whole. The applicants do not agree with the Examiner's assertion that the device of Hsu is "a uniform whole".

The applicants assert that Hsu discloses a very cumbersome method of making the reformer unit that is comprised of discrete layers that are simply packaged together. The end result is not "a uniform whole" as is the device claimed by the applicants. The applicants device although initially comprised of individual

layers, is transformed during the fabrication process, into a uniform whole in that there are no longer layer differentiations. The applicants device becomes integral and monolithic. The applicants device, unlike the device of Hsu, is not longer divisible into layers, and once formed into an integral, sintered, monolithic structure can not be taken apart into layers in that they are no longer identifiable as individual layers. The device of Hsu in contrast, remains divisible into discrete layers, and could be disassembled into identifiable layers subsequent to completion.

Furthermore, as previously stated the device of Hsu is claimed to be a compact unit. However, the applicants again assert that arranging discrete pieces of the reforming plates and thermally conducting plates and sealing in a gas tight enclosure as described takes up lot of room and it is not really suited for portable power applications, where the target application for the reformer is to supply hydrogen gas for fuel cell power source running cell phone, PDA, 2-way radio or a laptop computer.

The applicant has disclosed and amended the claims to claim a small, compact, highly integrated reformer processed using the multilayer ceramic technology into an integral, sintered, monolithic, three-dimensional unit. As stated in the applicant's previous amendment, the applicant has disclosed a device in which the various components are arranged to achieve fuel reforming in a small compact unit with high efficiency for portable power applications. This requires careful arrangement of the components that are thermally integrated.

The integral, sintered, monolithic ceramic unit disclosed and now claimed by the applicant accomplishes this requirement in a small compact unit for portable power application. As disclosed, the applicant's device is fabricated using multilayer ceramic technology. The required features of the various components (vaporizer, reformer, combustor etc. in the fuel reformer unit) required for the final unit are processed separately on individual ceramic sheets in green state (unsintered) and then they are laminated maintaining the structural integrity and sintered to form an integral, sintered, monolithic ceramic unit. The unit becomes uniform in composition in that the layers are no longer discernible as individual layers due to the sintering process. The resultant monolithic structure characteristics are unique to the applicants device and not disclosed or taught by Hsu. Communication between the various components is achieved by forming the required channels in the green state. This way it is possible to achieve simple and gas tight connections between the components during the sintering process, such that the only external required connections would be fuel inlet connected to the fuel tank and gas out put connected to the fuel cell. The compact design minimizes the total surface area (requiring minimum insulation around the reactor) and minimizes the losses into the surrounding through the reactor, thereby maximizing the fuel efficiency for portable power applications.

Accordingly, the applicant asserts that there is no anticipation in the device of Hsu to disclose an integral, sintered, monolithic multilayered three dimensional hydrogen generator as claimed by the applicants in independent claims 1, 11, and 18. In that claims 3, 5-8, 10, 13-16, 20, and 21 from independent claims 1, 11, and

18, respectively, the applicant asserts that they must contain each and every element of the claim from which they depend, and are therefore also in a condition for allowance. Claims 2 and 12 have been canceled herein. Claim 19 was previously cancelled. In light of the above remarks, the Applicant believes the 35 U.S.C. 102 rejection in light of the teaching of Hsu has been overcome. Notice to that effect is requested.

Claim Rejections - 35 U.S.C. § 103(a)

The Examiner has again rejected claims 4, 9, and 17 under 35 U.S.C. 103(a) as being unpatentable over Hsu, as applied to claims 1 and 11 above, and further in view of Ghosh et al., U.S. Patent No. 5,961,932, hereinafter referred to as Ghosh. The Examiner again enumerates specific rejections as to each claim.

The applicant again respectfully disagrees with this rejection and asserts that the claims are not obvious in light of the teaching of Hsu, in view of Ghosh. The applicant disagrees with the Examiner's assertions regarding the obviousness and asserts that Hsu fails to disclose the integral, sintered, monolithic three-dimensional device as previously described with respect to the 102 rejection. The applicants therefore assert that further modification of Hsu with the teaching of Ghosh also fails to disclose the applicant's claimed device. More specifically, the applicant asserts that further modification of Hsu by adding a resistive heater or serpentine channels fails to make obvious the applicant's device.

In that claims 4, 9, and 17 depend from independent claims 1 and 11, the applicant asserts that they must contain each and every element of the claim from which they depend, and are therefore also in a condition for allowance. In light of the above remarks, the Applicant believes the 35 U.S.C. 103 rejection in light of the teaching of Hsu, in view of Ghosh has been overcome. Notice to that effect is requested.

Double Patenting Rejection

The Examiner has rejected claims 1-18, 20 and 21 under the judicially created doctrine of obviousness type double patenting as being unpatentable over claims 1-12 of U.S. Patent No. 6,569,553. The Examiner asserts that although the conflicting claims are not identical, they are not patentable distinct from each other.

A Terminal Disclaimer is being filed herewith in accordance with 37 C.F.R. 1.132(c). Since the present application and United States Patent No. 6,569,553 were commonly owned at the time the invention in this application was made, this terminal disclaimer complies with 37 C.F.R. 1.132(c).

No election to pursue a particular line of argumont was made herein at the expense of precluding or otherwise impeding Applicants from raising alternative lines of argument later during prosecution. Applicants' failure to affirmatively raise

specific arguments is not intended to be construed as an admission to any particular point raised by the Examiner.

The Applicant believes that the subject application, is in condition for allowance. Such action is earnestly solicited by the Applicant. In the event that the Examiner deems the present application non-allowable, it is requested that the Examiner telephone the Applicant's attorney or agent at the number indicated below so that the prosecution of the present case may be advanced by the clarification of any continuing rejection.

SUMMARY: Reconsideration is respectfully requested. In view of the foregoing amendments and remarks it is believed that the application, including claims 1, 3-11, 13-18, 20 and 21, is now in condition for allowance. Notice to that effect is respectfully requested.

Authorization is hereby given to charge any fees necessitated by actions taken herein, including any extension of time fees, to Deposit Account 502117.

Respectfully submitted,

OFFICIAL

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